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NUTRITION IN PEDIATRIC ALLERGY

By JOHN P. McGOVERN, M.D. and JOSEPH I. ZUCKERMAN, M.D.*

Perhaps one of the greatest advances in the care of infants and children during the past 50 years has been due to increased knowledge gained from scientific experimentation as to their nutritional needs. A clear understanding of the fundamentals of nutrition now is a basic requisite for adequate medical supervision of healthy and sick infants and children. The *nutritional state* of an individual means "the condition of all tissues of his body both as to structure and to function, as influenced by the food that he eats, the amount of food constituents absorbed and the efficiency of utilization of these constituents" (1).

Likewise during the past 50 years since the word "allergy" was coined by Von Pirquet (2) considerable advances have been made in the understanding of allergic diseases. Allergy may be defined as any acquired specific alteration in the capacity to react which occurs in living organisms and tissues upon exposure to certain living or inanimate agents or substances (3). It can be thought of as a condition of unusual or exaggerated specific susceptibility to a substance which is harmless in similar amounts for the majority of members of the same species. In most instances the offending substance is protein in nature. Allergy encompasses such well known diseases as asthma, eczema, hay fever, perennial rhinitis, hives, and a host of bizarre complaints, which may be on an allergic basis, such as gastrointestinal upsets, migraine, Meniere's syndrome, and many others. In fact practically any organ or organ system may react as a shock area in allergic disease. It has been estimated (4) that ten percent of the general population is heir to a major clinical allergic disease in one or more manifestations and that an additional 40 or 50 percent have experienced or will experience some minor evanescent form.

In any chronic disease process, as is most allergic disease, nutrition is an inseparable problem. As we see it, the problem of nutrition in allergy is fivefold: (1) How nutritional factors effect the etiology of the allergic state, (2) How the allergic state may affect nutrition of sick infants and children, (3) How therapy of the allergic child involves nutritional factors, (4) How allergic manifestations may be prevented by nutritional means, and (5) How emotional and psychological factors peculiar to the allergic child and his family constellation affect nutrition.

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*See page 42.

The essential nutritional needs for normal growth and development of infants and children are succinctly covered in standard textbooks of pediatrics (5), (6) and need not be detailed here.

Effect of Allergy on Nutrition

A causal relationship between allergic disease and growth and development in the child has been demonstrated by Cohen and associates (7, 8). They noted growth failure to be 2½ times more common in allergic children than in normal controls and observed, "disturbed growth of the affected children as a group, even though they had continuous management of their allergy . . . " Two case histories were presented showing marked improvement on allergic management, however.

Walsh (9) evaluated the relationship between an adequate allergic control program and growth patterns of allergic children. Height and weight data were plotted on Wetzel grids for children who had been followed in the allergy clinic at Children's Memorial Hospital, Chicago. The Wetzel grid method was chosen because it not only evaluates physical status and body type but distinguishes between satisfactory and unsatisfactory growth progress. The principles of allergic management of these children can be considered acceptable. Thirty-four children ranging in age from 18 months to 11½ years were studied with a follow up period ranging from 12 to 100 months, averaging 36 months for the entire group. They represented cases of perennial rhinitis, hay fever, and asthma. Of the 34 patients, eighteen showed some degree of improvement in their growth patterns, fourteen continued to advance in an acceptable manner, while two showed very slight deceleration. Management in this group of allergic children then was attended by definite, though not marked, improvement in growth, as contrasted with an anticipated increased incidence of growth failure.

Factors which lead to poor nutrition and inadequate growth patterns in an allergic child are multifold and may exist in combination. The disease itself may lead to poor absorption and assimilation of essential food products. Obviously, an infant or child cannot eat properly during an asthmatic attack of wheezing and coughing — his hunger for air supersedes that for food. The effect of "recurrent colds" and constant nasal obstruction (perennial rhinitis) have a deleterious effect on appetite. Recurrent pulmonary infections in the asthmatic and skin infections in the eczema patient also tend to limit appetite. In food allergies sensitizing essential foods may be refused because they upset the patient and essential ones may be therapeutically eliminated.

Food Allergy

That reactions to foods were recognized among the ancients may be surmised from the well known axiom attributed to the philosopher Lucretius, in the first century before Christ, "One man's meat is another man's poison." Food allergy may be defined as a condition of unusual or exaggerated specific response to those foods to which the patient is sensitive, and when ingested in similar amounts by the majority of individuals, are harmless. Two nutritional aspects are involved: one, the way in which this allergy affects the nutritional state because of the multiple symptoms due to the offending foods themselves; i.e., diarrhea, vomiting, et cetera; and the other, the effect on the nutritional state when offending foods, containing essential materials are purposely avoided by the patient or have been eliminated from the diet by a physician without proper substitution.

Common Foods Associated With Allergic Manifestations

Anderson and Schloss (10) cite the works of Schlossman in 1905 and Horo in 1906 as being the first to report sensitivity to milk proteins, attributing it to the entrance of milk proteins into the blood stream. They amplified this concept by demonstrating precipitin to cows milk in greater than 80 percent of marasmic infants. Allergy to milk is now believed to be a common cause of a multiplicity of mild to severe symptoms in six to eight percent of infants fed artificial formulae (11). The symptoms reported have ranged from mild colic to anaphylactic-like shock (11), (12) with death reported in two infants. Milk is now recognized almost universally as a potential allergen (13, 14, 15, 16, 12, 17, 11, 18, 19, 20, 21, 22, 23, 24, 25, 26).

As an infant increases in age, he is exposed to a greater number of foods which are potentially allergenic. Foods which are introduced early to the infant usually include cereals, eggs, fruits, some meats or meat products, and if the baby was breast fed, cow's milk at the time of weaning. Among these foods, Rowe (14) has reported that in a group of 175 patients with food sensitivity, 57 were found sensitive to wheat, 35 to eggs, and 31 to milk. In this country, wheat is the most common grain allergen (14, 27).

Randolph and Yeager (28) have reported sensitivity to corn and bean to be an exceedingly important problem, ranking with wheat in the incidence of food allergy, and occurring in their studies in as high as 20 percent of allergic individuals. Bernton (29), however, has been unable to corroborate these findings and reports a 4 percent incidence.

Unaltered egg protein has been shown normally to be absorbed into the blood stream (30). Eggs should be omitted from the diet of the asymptomatic child until nine months of age.

Sensitivity to fish protein is quite common. Rowe (27) has found that sensitivity may exist to only certain fishes with tolerance to all others. Glaser (31) withholds fish from the diet until the infant is nine months of age.

Occasional cases of sensitivity to cod liver oil have been reported (32, 33, 34). Non-allergenic vitamin substitutes should be used in place of cod liver oil in the allergic child. Certain vegetables are more allergenic than others (27); spinach, tomatoes, the legumes, cucumbers, members of the cabbage family, onions, and garlic being frequently incriminated. The latter two are of special importance because of their universal use as flavoring agents and condiments. Allergy due chiefly to Irish potatoes has been reported (35). Vegetables should be added to the child's diet singly, rather than mixed as in soups.

Allergenicity to citrus fruits is frequently observed (27, 31, 23).

Brown (37) reported a case of primary allergy to grape products and grape wine. Grape juice, however, is considered hypoallergic and was found safe in infant feeding by Vignec and Weinberg (38).

Allergy to the meat and organ tissues of mammalian animals occurs, but less frequently than to milk, eggs, cereal, grains, fish, and certain other foods (27, 39). Of the commonly used meats, lamb is the least allergenic, pork is the most allergenic, with beef between the incidences of the two (27, 40). Gelatin has not been found to be allergenic in man or experimental animals (27, 41).

Primary soy bean sensitivity has been reported (27, 40), and a word on the subject is indicated because of the frequent use of soy bean products in milk allergy. Ratner et al. (42, 43) have demonstrated that soy bean antigen regularly traverses the gastrointestinal wall but is weakly antigenic, and thus the cause of allergic manifestations in only rare instances. They conclude that the cases of soy bean sensitivities reported are due to inhalation of soy bean dust rather than ingestion.

Wergeland (44) reported three fatal cases of sensitivity to breast milk which he considered due to familial allergy to human milk.

Allergy to nuts is not uncommon (27, 22).

Chocolate is usually included among the common allergens (27, 22) and we believe that chocolate should be restricted from the diet of the potentially allergic child until two and one-half to three years of age.

Though these foods and food products are most frequently encountered,

actually almost any food protein may serve as an allergen.

Table I summarizes some of the allergic symptom-complexes by organ systems in which they occur.

TABLE 1

Allergic Symptoms

(A) *Skin:*

(1) Recurrent attacks of urticaria.
(2) Pruritis without observable skin lesions.
(3) Atopic eczema.
(4) Various bizarre eruptions such as discrete, macular lesions which itch and excoriate so easily that they may be described as "blisters" by the patient.

(B) *Respiratory System:*

(1) Chronic or recurrent so-called allergic "colds."
(2) Chronic nasal obstruction, with or without watery discharge.
(3) Itching of the eyes and nose, especially common in children.
(4) Recurrent attacks of sneezing, frequently attributable by the patient to change in temperature.
(5) Paroxysmal attacks of croup, or croupy cough, more frequent in children but sometimes occurring in adults.
(6) Recurrent attacks of coughing without any evidence of infection and with or without mild wheezing.
(7) Recurrent attacks of bronchial asthma.
(8) Redness and granulation of the palpebral conjunctivae that shows little change with time.
(9) Swollen, watery, pale inferior nasal turbinates with "pigskinning," at times without nasal symptoms, except "stuffiness."
(10) Residual wheezing brought out by deep breathing and coughing, or by forced expiration.

(C) *Central Nervous System:*

(1) Recurrent headaches, without definite pattern but more likely to occur during the night or early morning hours, usually frontal or generalized.
(2) Attacks of undue drowsiness which are generally foreign to patient; likely to occur after dinner in the evening preceding an attack of migraine.

(D) *Gastrointestinal System:*

(1) Belching, bloating, colic (very frequent in children), chronic fullness, flatulence, attacks of mild nausea.

(2) Recurrent attacks of mild diarrhea.

(3) Regurgitation or retasting of food for some time after eating.

(4) "Heartburn" occurring chronically in adults and frequently associated with a major allergic disturbance.

(5) Celiac syndrome.

(E) *Musculo-Skeletal System:*

(1) Recurrent attacks of soreness, pain, and/or swelling about the joints, tendons, and muscles without fever.

(F) *Genitourinary System:*

(1) Attacks of frequency of urination, with or without pain and without apparent cause.

As can be surmised from Table I, many of the symptoms due to food allergy in and of themselves may lead to nutritional disturbances.

It is important to point out, however, that the actual symptoms which may be produced by food allergy, or for that matter any allergy, can also be produced by non-allergic mechanisms, since an organ can respond only in a limited way if it responds at all (45). Selye (46) adroitly summarized this concept when he stated: "The apparent polymorphism of the response to systemic stress is largely due to local factors in various organs, which influence the end results of such simple reactions. For instance, injury to the gastric or duodenal mucosa rapidly leads to the formation of an ulcer, . . . injury to the hepatic cells tends to cause fatty degeneration . . . Every organ, if it responds at all, does so in its own characteristic way. Under no conditions will systemic stress cause steatosis of the stomach or ulcer formation on the liver surface!" Thus great care must be exerted in the diagnosis of food allergy.

Two methods are frequently helpful in identifying poorly tolerated foods (45). The elimination diet is used when symptoms occur daily or nearly so. Many excellent and detailed elimination diets are available (27), but modification of a very simple one described by Alvarez (47) has much practical merit. The patient is put on pear, rice, and lamb for a period of six to seven days. If the symptom in question is due to food and is much worse at the end of this period, it is probably caused by one of the foods in the elimination diet. In such instances a new diet is prescribed in which the foods initially

eaten are avoided. If the patient is relieved, however, foods are added to the diet one or two at a time at three or four day intervals until the symptom returns. The last food or foods eaten are suspected. If, with their removal, the symptom again clears, the evidence becomes stronger. Final opinion as to the final diagnosis should be withheld until symptoms consistently develop after the ingestion of the food several times. Barium studies with and without the food may offer confirmatory evidence (45).

The "Food Diary" is useful and indicated in those patients whose symptoms are possibly due to food but occur at intervals ranging from several days to a week or more. This system, using chart form, lists all the foods eaten each day and symptoms are checked on the day they occur. The method is fully described in Rinkel's *Food Allergy* (48).

Skin testing, which is of considerable value in the diagnosis of contactant and inhalant allergies, is not nearly so helpful in food allergy. There seems to be an inverse correlation between the length of time required for symptoms to follow the ingestion of an allergen and the likelihood of getting positive skin reactions. When this time is short, the skin tests most frequently yield positive results. When a number of hours are required for symptoms to become manifest, the skin tests usually give negative reactions, thus, the causal relationship between food and symptom is clearest when the incubation period is short (45). It should be kept in mind, however, that when the incubation period between ingestion of food and symptoms is short, the patient has frequently made his own diagnosis before the physician has seen him. This is usual when the offending foods are infrequently eaten.

Infantile Eczema

We have chosen the allergic or atopic form of infantile eczema to illustrate the nutritional problems that arise from misdiagnosis, complications of therapy (i.e. over and under treatment), and psychologic factors that also arise and affect nutrition. As will be seen readily, these problems apply to the management of other types of allergic disease.

It is not our purpose to deal with the differential diagnosis of the several forms of infantile eczema. Suffice to say, that in the allergic or atopic form of infantile eczema, sensitivity to specific foods is well recognized often to be a major etiologic factor. Common offending foods in this respect are milk, egg, wheat, and occasionally orange juice. Thus, it frequently becomes necessary to eliminate one or more of these important foods. When one considers that milk is basic in infant nutrition, the hazards of its elimination and substitution are quite apparent.

Milk

Even the use of well accepted cow's milk formulae in place of natural breast feeding is of concern, for this is a substitution of potentially allergenic protein.

Grulee and Sanford (15) studied the incidence of eczema in infants up to nine months of age and found it lowest among those babies who were breast fed from birth. Using three groups of babies; namely (1) those breast fed only; (2) those both breast and artificially fed; (3) those solely artificially fed, they found that the incidence of eczema in the partially breast fed group was twice that in the breast fed group, and in the artificially fed group was seven times that in the breast fed group. It has been estimated that the incidence of allergy to cow's milk in the general population is 1.5 percent (49), and up to 15 percent in a group of patients in an allergy clinic practice (50).

Of the two major proteins in milk, casein and lactalbumin, the lactalbumin fraction which is species-specific is usually the offending allergen. Some allergists prefer, therefore, to try substitution with the milk from another mammal such as a goat before introducing milk substitutes or attempting modification of the protein by the use of evaporated milk or by boiling whole cow's milk. If casein is the offending protein, a milk substitute should be used.

The most common milk substitute is a soy bean mixture. Soy bean "milk" has been shown to contain all of the amino acids necessary for normal growth and development (51, 52, 23). Albanese (53) presented data to show that the amino acid content of soy bean may actually be superior to the protein of breast milk in meeting the amino acid requirements of infants after the first few weeks of life. Tso (54), as early as 1929 in China successfully fed six infants on a diet substituting soy bean for mammalian milk. Since that time soy bean milk has been shown to have high biologic value, is high in unsaturated fatty acids, supplies essential nutritional quantities of protein, fat, carbohydrate, and minerals, and in short provides an excellent substitute for human or cow's milk (57, 58, 59, 60, 11, 61). Cowman (55) and Kunitz (56) showed that a heat labile trypsin inhibitor is present in large quantities in soy bean. This apparently retards casein digestion. Until that time physiologists and nutritionists were puzzled as to why this adequate protein failed to support good growth. Modern methods of preparing soy bean flour inactivate trypsin inhibitor, however. Clein (50) found that in an older age group of allergic children, six percent were intolerant of soy bean milk. Glaser's (24) data reported about twice this percent of children intolerant of soy bean milk, probably due

to the fact that his patients were fed soy bean milk from birth, whereas Clein's patients were older when soy bean was introduced. One factor which may have influenced the incidence of "intolerance" is the apprehension of many mothers, who frequently have doubts about the validity of feeding a baby any substitute other than orthodox cow's milk. It has been our experience, as well as that of others, that among the relatively infrequent complications of soy bean milk are diarrhea, perianal dermatitis, vomiting, allergy to soy bean protein itself, refusal to take the soy bean preparation, and hypoproteinemic edema. One must note that hypoproteinemia is not due to deficiency of adequate amino acids in the soy bean milk, but is probably due to a combination of loss of serum protein through weeping lesions of the skin, improper feeding techniques, refusal of the infant to take adequate quantities of the mixture, superimposed infections, and poor protein synthesis due to faulty metabolism in the liver. Ayres and associates (62) reported diminished liver function demonstrated by the BSP excretion test in 85 cases of chronic dermatoses and eczema where no marked evidence of infection was present. Wolpe (63) measured blood protein levels in infantile eczema and found that 26 percent of 54 cases had protein deficiency. These were classified into three types: prehepatic, hepatic, and post-hepatic. The prehepatic type was considered to be due to interference with the intake, digestion, or absorption of proteins. The hepatic type was due to the inability of the liver to adequately synthesize protein despite sufficient supply of amino acids. The post-hepatic type was thought to be due to an abnormal loss of protein despite an adequate supply and synthesis. Most likely all three types coexist to varying degrees in severe infantile eczema. Wolpe (63) showed the primary deficit in plasma proteins to be greater in the globulin than in the albumin fraction. Nisenson (64) and Cooke et al. (65) however demonstrated that the significant drop in proteins in eczematous children was primarily in the albumin fraction. Beiling and Lee (66) feel that poor diet alone without weeping and infection rarely produces hypoproteinemia. They note that when eczema was extensive but without weeping and the protein diet adequate, the total protein usually shows no significant change.

A case from our files illustrates several of these points.

C.W. T-53-107494

This sixteen month old colored male was first seen by us and admitted to Charity Hospital on 5-17-54 with a history of eczema, initially noted on his cheeks at age three months. By age five months, the eczema was generalized. Treatment had consisted of various "ointments." Foods received included pineapple and tomato juice (substituted for orange juice), vitamins, pureed meat and rice. He received cow's milk and had been eating a whole raw egg every other day. The eczema varied

in severity and had necessitated admission to another hospital for one month. There were frequent head colds and fever with changes in weather. Goat's milk had been tried without success for two weeks before admission.

Physical examination revealed obvious retardation of growth and development, his admission weight being only 11 pounds 14 ounces. He was in less than the third percentile for all measurements. The liver was palpable 2 to 3 cms. below the right costal margin. Laboratory data revealed a hemoglobin of 12 grams, white blood count of 12,400/cmm., and a blood eosinophilia of 12 percent. Stool examinations were negative for ova, cysts, parasites, excessive fat, and eosinophiles. Stool trypsin was positive in 1/120 dilution. Serology, urinalysis, multiple x-rays, E.K.G., and blood chemistries were within normal limits.

He was treated with coal tar ointment and received a diet of soy bean milk, rice cereal, banana, lamb, carrots, and supplemental vitamins and iron. During the next two months he gained six pounds and was discharged.

He gained at home on this regimen for over two months. Eight days before the next admission in October, 1954, he began to have swelling of the feet and legs which progressed, and involved the face and abdomen on the day prior to admission. Though appetite initially was said to be good and in spite of the edema, he had lost approximately four pounds. Further questioning of the mother revealed that he had been refusing the soy bean milk and that it was not being offered regularly.

Generalized edema and dry scaling eczema was noted on physical examination. Laboratory data revealed an anemia of 7 grams hemoglobin, urinalysis negative. Serum proteins were 4 grams/100 ml. with an albumin of 2.4 grams. Thymol turbidity was 10.8.

He was placed on whole cow's milk with the remainder of the diet continued as before. The eczema cleared and edema subsided, and during a period of four weeks he gained three pounds.

He was followed in the clinic with continued good weight gain. The skin remained somewhat dry and scaly but this disappeared completely by age 2½ years.

In spite of this case and others like it that we have observed, we do not feel that the hypoproteinemia and resultant edema is due to inadequacy of soy bean milk. It is due rather, to one or more of the factors of: insufficient intake of the soy bean milk (improper feeding techniques or refusal of the infant to take the mixture), infections, intrinsic liver malfunction, and loss of plasma protein through weeping from the skin. Further studies may show other intrinsic mechanisms that modify or interfere with protein absorption and utilization in infantile eczema. We strongly urge that if hypoproteinemia and/or edema or nutritional imbalance is in evidence by growth failure, that dietary control directed at allergic management should be modified or abandoned. It is much more important that the infant grow within normal limits than have improvement of his eczema.

Meat base formulas (24) or protein hydrolysate mixtures (67) should be tried if soy bean products are refused or are not well tolerated. We have noticed as has Hill (61) that babies tire of protein hydrolysate formulas more easily than from soy bean milk preparations.

It has been noted that a number of infants without eczema but with

gastro-intestinal disturbances, (16) and in our experience several infants with eczema who were allergic to cow's milk and who failed to respond to substitution with soy bean milk, have been successfully treated with meat base milk. Of meats used in these formulas, lamb seems to be the least allergenic though other meats have been successfully used. Capon or rooster is recommended for the patient who is highly egg sensitive for there might be enough egg protein in the blood and tissues of the female to cause an allergic response.

Pommerenke and associates (68) found that beef serum was the most effective protein with qualitative as well as quantitative significance in the regeneration of plasma proteins.

Egg, Wheat and Orange

Egg white which is composed of a number of specific proteins is a frequent and potent sensitizer; the yolk being relatively unimportant, though it is said to contain a specific protein of its own. All reactions to egg white can not be avoided by hard boiling (30), since the ovomucoid of egg white is not rendered insoluble or altered immunologically by boiling. Generally speaking, egg yolk can be fed after hard boiling to the allergic infant. If the infant is exquisitely sensitive to egg white, however, small traces of the latter in the yolk may be sufficient to produce symptoms. Egg yolk is one of the best sources of iron for the growing infant and child; if it is eliminated other iron containing foods or supplemental iron salts must be given.

Wheat is an important sensitizer and should not be started initially among the cereals in potentially allergic infants. This would apply to mixed cereals in which wheat is present. Rice cereal is probably least allergenic among the cereals and is used by us frequently as a substitute for wheat cereal. Barley and oat cereals also have been used with success.

In potentially allergic infants, we do not start orange juice until after one year of age but use synthetic (hypoallergic) vitamins to supply the vitamin C requirements. Ratner (67) has pointed out that infants are infrequently allergic to the juice protein of orange but may demonstrate allergic manifestations to the seed or peel oil protein. Hypoallergenic orange juice is commercially available in which seed protein and peel oil are negligable.

A number of other remedies with nutritional implications have been advocated for the treatment of infantile eczema. Hansen et al. (70) performed clinical and blood lipid studies in 225 patients with eczema and 100 control subjects. Serum lipid values on 171 of the eczematous patients disclosed that 80 percent of infants under two years of age, 75 percent of children between

two and fifteen years, inclusive, and 50 per cent of adults had iodine numbers for the serum fatty acids below the mean values for the 100 control subjects. They also noted that periodic studies of the serum lipids of patients with eczema revealed a tendency for the iodine numbers of the serum fatty acids to increase as the clinical condition improved following supplementation of the diet with fats rich in unsaturated fatty acids. An increase in the degree of unsaturation of the serum fatty acids also was observed to coincide with clinical improvement of patients treated solely with crude coal tar ointment. When fats rich in unsaturated fatty acids, such as lard and certain vegetable oils were added as the sole form of therapy in 148 eczematous patients of various ages, a clinical response judged good to excellent was noted in 60 and fair to good in 51. The remaining 37 patients showed slight or no benefit. The authors also note that the use of unsaturated fatty acid with soy bean preparations as milk substitutes appeared to be beneficial to a degree greater than would be anticipated on the basis of relief from sensitivity to milk proteins alone. It would appear from these data that the inclusion in the diet of fats rich in unsaturated fatty acids might be of definite benefit in many eczematous patients. One deficiency in this work is that the group of patients studied were not well broken down into the various catagories of eczematoid involvement; i.e., infectious, seborrheic, atopic, and contact.

In 1954 Spikard (71) reported a therapeutic agent consisting of I-Tyrosine, pyrodoxine hydrochloride, and niacinamide which was used in the treatment of 135 infants and children showing various proved manifestations of allergy. The majority showed significant improvement of allergic symptoms. Of the group 34 had atopic eczema of which 25 showed rather marked improvement on his regimen. Further studies as to nutritional implications are indicated, since the majority of children under continuous treatment for a few months gained weight at a more rapid rate than formerly.

Calcium therapy in allergic disorders has received considerable attention but we do not feel that its efficacy has been firmly established. Kurtz (72) reported apparently good results in nine allergic patients.

ACTH and Cortisone

Both topical cortisone and parenteral administration of ACTH or cortisone have frequently been used in severe resistant atopic infantile eczema (73). Parenteral use of these steroids should be reserved for the most severe and resistant cases that are doing poorly in spite of the more usual therapeutic regimens. Negative nitrogen balances may result from administration of ACTH or cortisone in large doses, whether nitrogen intake is high or low

(74). Generally, however, relatively small amounts of these steroids produce excellent results and Hill (75) states that he has seen no evidence so far that cortisone in the dosage used has seriously interfered with growth or bone maturation. He recommends starting with 75 mg. a day; as soon as eczema is controlled, the amount is reduced by 12½ mg. at intervals to determine the patient's daily maintenance requirement. This treatment should be used for severe cases only, and for a short time to relieve immediate distressing situations.

From time to time a number of workers have considered the possibility of "Food Desensitization" as a therapeutic measure. We do not believe that this is a practical or effective method.

We would like to stress again that it is more important to keep the infant with atopic eczema in good nutritional balance than to sacrifice this aspect in attempts at substitution or other forms of therapy.

Prevention of Eczema

Several nutritional concepts have recently been advocated concerning the prevention of atopic infantile eczema in infants with allergic family backgrounds. Glaser and Johnstone (24, 25, 21) in a series of articles postulate that if milk proteins were withheld completely from the infant diet until the period of "physiologic immunologic immaturity" was passed, the symptoms of milk allergy might be avoided, minimized or even prevented. Their data indicate that this is the case, for when soy bean milk was substituted for human or cow's milk at birth there was a marked reduction of infantile eczema, other milk allergies, and interestingly a decrease in the development of later unrelated allergic phenomena as compared to a control group.

Gruskay and Cooke (76) recently demonstrated an increased absorption of structurally unmodified protein (they used crystalline egg white in the test feedings) in infants with diarrhea and during their recovery period from diarrheal disorders. It is postulated that it might be wise to restrict or limit highly sensitizing food proteins during these diarrheal episodes. A soy bean milk or meat base milk could logically be used during this period. Work in this laboratory (77) is being done to determine if there is an increased transport of structurally unmodified protein through the gastrointestinal tract in infants with atopic eczema as contrasted to a normal control group.

Psychological Aspects

Eating, besides satisfying a physiologic need, may reflect a psychological state, as in overeating of the emotionally deprived and anorexia of the de-

spairing (78). Those who deal with both well and sick infants and children are aware of the close interrelationship between feeding and nutrition and emotional disturbances in these age groups. The problem of children at the negativistic age refusing to eat in order to gain attention and control of the family has been discussed succinctly by Platou (79). Withholding of a full measure of stable, warm, mothering attention during infants' feeding for any reason may result in starvation of the personality as surely as withholding vitamin D results in rickets (80). The importance of oral gratification and hunger satiety in the infant has been stressed repeatedly in the psychiatric literature. An infant learns early that certain foods, particularly milk, allay hunger and give comfort. As the baby matures, he is better able to distinguish difference in texture, temperature, and taste of foods. He learns to accept certain food properties as desirable and to reject others as undesirable (81). He learns also that he can influence parental attitudes by his acceptance or rejection of certain foods (82). If he refuses food, he may get extra parental attention in the form of bribery, coaxing, or punishment; if he eats "seconds" he may have rewards, praise, extra parental love and affection.

Food likes and dislikes may be a reflection of ethnic, national, regional, or family eating habits. Familiar foods are usually relished when prepared in familiar ways, and offer a type of emotional security simply because they are familiar. Foods prepared in unfamiliar ways are often regarded with distaste and suspicion. If one finds it difficult to make adjustments generally, he frequently does not wish to have to make adjustments to new foods (83). Early in life certain foods become associated symbolically with diverse emotional meanings. There are reward foods such as candy and ice cream; those symbolic of rejection of parental authority such as spinach and carrots, which call forth resistance on the part of the child; and others which are forbidden such as coffee, tea, and beer (81).

During the past two or three decades a flood of advice has been directed toward parents as to the "best" psychological methods of rearing children — it has varied from the strict concept of conditioning a child to the correct way of life ("as a twig is bent so shall the tree grow") to the most modern, so-called "permissive" school (84). This has led to much confusion on the part of parents who have only to deal with relatively normal children. How great become the emotional problems involved in nutrition when allergic phenomena are superimposed upon the developing infant or child!

An untoward reaction to the ingestion of a wholesome food can be caused by a psychogenic mechanism as well as an allergic one or by combined psychogenic and allergic mechanisms (81). Frequently it is difficult to

evaluate the relative importance of psychogenic and allergic factors in the reactions of a given patient. Psychiatrists (85) speak of the emotional patterns in allergy as "deep dependence on a mother figure plus the fear of becoming estranged from her by somehow offending her." Primary allergenic food reactions are often followed by secondary psychogenic reactions which may be more incapacitating than the initiating noxious stimulus.

It might seem superficially that the allergic child is exposed to the same emotional climate as other children in our culture, at least prior to the onset of his clinical symptoms. This is not the case, however, (86) and the difference lies in the exposure to maternal rejection which is significantly more common in the allergic than in the non-allergic child (87). Some have argued (88) that maternal rejection results from allergic illness, but Miller and Baruch (87) believe that maternal rejection often is primary rather than secondary, and that it is an adverse influence in the emotional climate into which the allergic child is born. Mothers of allergic children frequently tend to be relatively rather strong, active, bossy and anxious with a great need to be in control (89). The mother's attitude toward the child, varies from extreme concern and overprotection to one of intolerence, impatient annoyance and rejection.

Allergic children apparently handle their hostility differently from the non-allergic child (87), for even discounting his illness the allergic individual more characteristically turns his hostility in upon himself. This may reflect in overeating, undereating and bizarre "food fads" that secondarily affect the child nutritionally. Parents generally feel that certain foods should be eaten and these are forced on the child with added trauma of further hostility and ill-feelings (90).

Within this maelstrom of allergic disease, emotional trauma, and resultant feeding problems, there is little wonder at the generally observed poor nutritional status with aberrant growth and developmental patterns in the allergic infant and child.

As allergic children mature, many develop "fads" about their eating and they may evolve so many food prejudices as to deprive themselves of a balanced diet, develop malnutrition, anemia, and other deficiencies to add to their preexisting allergic disease. Particularly are they apt to shun meats or high protein foods (90). As an allergic child grows older, if he has the continued guidance of a competent and understanding physician, he should understand and be able to cope with his allergies fairly well. If on the other hand he has been mishandled or as is so often the case he has drifted from one physician to another, he may be thoroughly confused and a complete

skeptic regarding any therapeutic regimen. All of this, of course, applies equally to the parents.

Generally, we feel that in allergic conditions wherein food and nutrition are a major problem, emphasis of this aspect to the child, by both parents and physician, should be held at a workable minimum. Constant "harping" on the diet to the developing child can lead only to confusion, rejection of foods and emotional upheaval. This is particularly true when food substitutes tend to differ from the model diet for a particular familial, socio-economic group and to be unattractive in either appearance or taste to the child. Acceptable measures to encourage allergic children to eat are: to serve food as attractively as possible, give small helpings, serve food with minimal comment, and to place little stress on the amount of food to be eaten. Parents should try to maintain a calm, unworried attitude towards the child's eating, for nothing creates a feeding problem in allergic children more quickly than an over-anxious demeanor. No stress on table manners should be made with very young children, and finger feeding should be allowed until the child has become fairly proficient in eating.

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REFERENCES CITED

1. McHenry, E. W. Nutrition and Endocrine Function. *Borden's Review of Nutrition Research,* 16:17, (1955).
2. Von Pirquet, C. Allergy, *Munchen Med. Wchnschr.* 53:1457, (1906).
3. Milne, J. A. Food Allergy. *Proc. Nutrit. Soc. Lond.* 14:54-56, (1955).
4. Vaughan, W. T. and Black, J. H. *Practice of Allergy.* 3 Ed. C. V. Mosby Company, St. Louis, Mo. (1954).
5. Nelson, W. E. *Textbook of Pediatrics.* 6 Ed. Philadelphia and London. W. B. Saunders Co. (1954) pp. 79-95.
6. Holt, L. E., Jr., and McIntosh, R. *Pediatrics.* 12 Ed. New York, Appleton-Century-Crofts, Inc. (1953) pp. 166-195.
7. Cohen, M. B. et. al. Anthropometry in Children. *Am. J. Dis. Children,* 60:1058 (1940).
8. Cohen, M. B. and Abram, J. E. Growth Patterns of Allergic Children. *J. of Allergy,* 19:165 (1948).
9. Welsh, J. B. The Effect of Allergy Management on Growth and Development of Allergic Children. *J. Pediat.* 38:571, (1951).
10. Anderson, A. F., and Schloss, O. M. Allergy to Cow's Milk in Infants with Nutritional Disorders. *Am. J. Dis. Children,* 26:451-474, (1923).
11. Clein, N. W. Cow's Milk Allergy in Infants. *Pediat. Clin. N. America,* November 949-962, (1954).
12. Collins-Williams, C. Acute Allergic Reactions to Cow's Milk. *Ann. Allergy,* 13:415-421, (1955).
13. Ratner, B. The Treatment of Milk Allergy and Its Basic Principles. *J. A. M. A.,* 105:934-949, (1939).
14. Rowe, A. H. *Food Allergy: Its Manifestations, Diagnosis, and Treatment with a General Discussion of Bronchial Asthma.* Philadelphia (1931), Lea and Febiger.
15. Grulee, C. G., and Sanford, H. M. The Influence of Breast and Artificial Feeding on Infantile Eczema. *J. Pediat.* 9:223-225, (1936).
16. Glaser, J., and Johnstone, D. E. The Use of Meat as the Source of Protein in Milk Substitutes in Allergic Gastrointestinal Disorders of Early Infancy. *Ann. Allergy,* 10:564-568, (1952).
17. Glaser, J. Treatment of Eczema (atopic dermatitis) in Infants. *J. A. M. A.,* 137:527-531, (1948).
18. Stoesser, A. V., and Nelson, L. S. The Beneficial Effects of Soybean Products in Eczema of Infancy and Childhood. *Lancet,* 73:487-495, (1953).
19. Glaser, J. and Johnstone, D. E. Prophylaxis of Allergic Disease in the Newborn Infant. *J. Allergy,* 25:447-452, (1954).
20. Hill, L. W. Editorial: Soybean Milk as a Milk Substitute for Potentially Allergic Infants. *J. Allergy,* 24:474, (1953).
21. Johnstone, D. E., and Glaser, J. Use of Soybean Milk as an Aid in Prophylaxis of Allergic Disease in Children. *J. Allergy,* 24:434-436, (1953).
22. Kahn, I. S. Food Allergy; A General Discussion of Twenty-Five Years of Experience. *Ann. Allergy,* 8:508-514, (1950).
23. Glaser, J. The Prophylaxis of Allergic Disease and Some Factors in the Management of Chronic Allergic Disease in Pediatric Practice. *Ann. Allergy,* 12:30-41, (1954).
24. Glaser, J., and Johnstone, D. E. Soybean Milk as a Substitute for Mammalian Milk in Early Infancy. *Ann. Allergy,* 10:433-440, (1952).

25. GLASER, J., and Johnstone, D. E. Prophylaxis of Allergic Disease in the Newborn. *J. A. M. A.* 153:620-622, (1952).

26. ANDERSON, A. F. R. Gastrointestinal Manifestations of Food Allergy.*Med. Jour. and Rec.*, 122:271-275, (1925).

27. ROWE, A. H. *Elimination Diets and The Patients' Allergies.* Philadelphia (1944), Lea and Febiger.

28. RANDOLPH, T. G., and Yeager, L. B. Cane Sugar as an Allergen. *Ann. Allergy,* 7:651, (1949).

29. BERNTON, H. S. On The Sensitiveness to Corn. *Ann. Allergy,* 9:368-377, (1951).

30. WILSON, S. J., and Walzer, M. Absorption of Undigested Protein in Human Beings: Absorption of Unaltered Egg Protein in Infants and Children. *Am. J. Dis. Children,* 50:45-54, (1935).

31. GLASER, J. Office Management of the Allergic Child. *Am. J. Dis. Children,* 77:217-243, (1949).

32. BALYEAT, R. M., and Bowen, R. Cod Liver Oil Sensitivity in Children. *Am. J. Dis. Children,* 47:529-533, (1934).

33. HOFFMAN, S. J., and Rattner, H. Infantile Eczema from Cod Liver Oil; report of two cases. *J. A. M. A.,* 107:494, (1936).

34. STOESSER, A. V., and Nelson, L. S. *Ann. Allergy,* 10:703-704, (1952)

35. Allergy Due Chiefly to Irish Potatoes, Editorial. *Postgrad. M.,* 17:25, (1955).

36. KUNSTADTER, R. H., and Schultz, A. Gastrointestinal Allergy and the Celiac Syndrome with Particular Reference to Allergy to Cow's Milk. *Ann. Allergy,* 11:426-434, (1953).

37. BROWN, E. A. Sensitivity to Grape and Grape Products Including Wine. *Ann. Allergy,* 11:590-594, (1953).

38. VIGNEC, A. J., and Weinberg, S. Grape Juice in Infant Feedings; Comparative Sensitivity to Orange and Grape. *J. Pediat.,* 44:294-298, (1954).

39. SEEBERG, G. Eczematous Dermatitis from Contact with or Ingestion of Beef, Pork and Mutton (4 case reports). *Acta Derm. Vener. Suppl., Stockh.* 29:320-322, (1952).

40. ROWE, A., and Rowe, A. H. Strained Meat Formulas in Allergic Diseases of Infants and Children. *California Med.,* 81:279-280, (1954).

41. RATNER, B., and Crawford, L. V. The Allergenicity of Gelatin. *Int. Arch. Allergy,* Basel, 6:370-371, (1955).

42. RATNER, B., and Crawford, L. V. Soybean, Anaphylactogenic Properties. *Ann. Allergy,* 13:289-295, (1955).

43. RATNER, B., Untracht, S., Crawford, L. V., Malone, H. J., and Retsina, M. Allergenicity of Modified and Processed Foodstuffs. V. Soybean; Influence of heat on its allergenicity; use of soybean preparations as milk substitutes. *Am. J. Dis. Children,* 89:187-193, (1955).

44. WERGELAND, H. Three Fatal Cases of Probable Familial Allergy to Human Milk. *Acta Pediat.* 35:321, (1948).

45. DERBES, V. J., and Little, E. J. Gastrointestinal Allergy. *Am. Pract. and Dig. of Treat.* 3:555, (1952).

46. SELYE, H. *The Physiology and Pathology of Exposure to Stress.* Montreal, (1950), Acta, Inc.

47. ALVAREZ, W. C. *Help Your Doctor to Help You When You Have Food Allergy.* New York, (1941), Harper and Brothers.

48. RINKEL, H. J., Randolph, T. G., and Zeller, M. *Food Allergy.* Springfield, Illinois, (1951), Charles C. Thomas.

49. GLASER, J. Substitutes for Cow's Milk in Infant Feeding. *J. Pediat.* 42:734-738, (1953).

50. CLEIN, N. W. Cow's Milk Allergy in Infants. *Ann. Allergy,* 9:195-204, (1951).

51. OSBORNE, T. H., and Mendel, L. B. The Use of Soybean as Food. *J. Biol. Chem.,* 32:369, (1917).

52. STERNBERG, S. D., and Greenblatt, I. J. Serum Protein Values in Infants Fed Soybean Milk. *Ann. Allergy,* 9:190-204, (1951).

53. ALBANESE, A. A. Protein and Amino Acid Requirements of Infants. *Pediatrics* 8:455, (1951).

54. TSO, E. A Vegetable Milk Substitute for North China. *Am. J. Physiol.,* 90:542, (1929).

55. BOWMAN, D. E. Fractions Derived From Soybeans and Navy Beans Which Retard Digestion of Casein. *Proc. Soc. Exper. Biol. and Med.,* 57:139, (1944).

56. KUNITZ, M. Crystallization of Trypsin Inhibitor from Soybean. *Science,* 101:668, (1945).

57. CAHILL, W. M. et. al. Digestibility and Biological Value of Soybean Protein in Whole Soybeans, Soybean Flour, and Soybean Milk. *J. Nutrition,* 28:209, (1944).

58. SCHROEDER, L. J. et. al. The Utilization of Calcium in Soybean Products and Other Calcium Sources. *J. Nutrition,* 32:413, (1946).

59. STOESSER, A. V. Clinical Evaluation of Soybean Food in Eczema of Children. *Ann. Allergy,* 2:404, (1944).

60. STOESSER, A. V. Influence of Soybean Products on the Iodine Number of the Plasma Lipids and the Course of Eczema. *J. Allergy,* 18:29, (1947).

61. HILL, L. W. The Treatment of Eczema in Infants and Children. *J. Pediat.,* 47:648-659, (1955).

62. AYRES, S., JR., Ayres, S. III., and Mirovich, J. I. Macrocytic Anemia and Impaired Liver Function in Eczematous and Certain Other Dermatoses. *Arch. Dermat. and Syph.,* 62:851, (1950).

63. WOLPE, L. Z. Blood Protein Depletion in Infantile Eczema. *California Med.* 67:156, (1947).

64. NISENSON, A. Hypoproteinemia and Edema in Eczema. *J. Pediat.* 46:544-551, (1955).

65. COOKE, R. A., Sherman, W. B., and Menzel, A. E. O. ACTH and Cortisone in Allergic Disease. *J. Allergy,* 22:211, (1951).

66. BELING, C. A., and Lee, R. E. Treatment of Hypoproteinemia by Oral Administration of Protein Hydrolysate. *Arch. Surg.* 43:735, (1941).

67. HILL, L. W. Sensitivity to Cow's Milk in Infantile Eczema. *J. Pediat.* 12:725, (1938).

68. POMMERENKE, W. T., Slavin, H. B., Kariher, D. H., and Whipple, G. H. Blood Plasma Protein Regeneration Controlled by Diet. *J. Exper. Med.* 61:261, (1935).

69. RATNER, B., Untracht, S., Malone, H. S., and Retsina, M. Allergenicity of Modified and Processed Foodstuffs. IV. Orange: Allergenicity of Orange Studied in Man. *J. Pediat.,* 43:421-428, (1953).

70. HANSEN, A. E., et. al. Eczema and Essential Fatty Acids. *Am. J. Dis. Child.,* 73:1, (1947).

71. SPICKARD, V. W. Tyrosine as an Antiallergic Agent. *Northwest Med.,* 53:136, (1954).

72. KURTZ, G. I. The Relief of Allergic Disorders with a Double Calcium and Phosphate Salt. *J. Med. Soc. New Jersey,* 50:308-310, (1953).

73. O'KEEFE, E. S. Relationship Between a Careful Dietary Study and Cortisone Therapy in the Treatment of Infantile Eczema. *Ann. Allergy,* 13:96, (1955).

74. GEPPERT, L. J. The Effect of Cortisone on Nutrition. *J. Pediat.,* 39:267, (1951).

75. HILL, L. W. Oral Cortisone Treatment of Infantile Eczema. *New Eng. J. Med.,* 248:1051-1056, (1953).

76. GRUSKAY, F. L., and Cooke, R. E. The Gastrointestinal Absorption of Unaltered Protein in Normal Infants and in Infants Recovering from Diarrhea. *Pediatrics,* 16:763, (1955).

77. McGovern, J. P., and Baer, H. Unpublished Data.

78. Mealtime, Editorial. *Lancet* 1:530, (1953).

79. Platou, R. V. Johnny Won't Eat. *Bull. Tulane Med. Faculty,* 3:41-47, (1944).

80. Wallace, M. V. Feeding the Hospitalized Child. *J. Am. Diet. Assoc.,* 29:448-453, (1953).

81. Kaufman, W. Some Psychological Aspects of the Treatment of Patients Who Have Food Allergies. *Ann. Allergy,* 9:660-664, (1951).

82. Kluckholm, C. and Murray, H. A. (Eds). *Personality in Nature, Society and Culture.* New York, (1948). Alfred A. Knopf.

83. Burton, R. *Anatomy of Melancholy.* (Ed. F. Dell and P. Jordan-Smith) New York. Tudor Publishing Co., (1948).

84. Bruch, H. Psychiatric Aspects of Changes in Infant and Child Care. *Pediatrics,* 10:575, (1952).

85. French, T. M. et. al. *Psychogenic Factors in Bronchial Asthma.* Psychosomatic Medicine Menographs, New York, (1941). American Society for Research in Psychosomatic Problems.

86. Miller, H., and Baruch, D. W. Psychosomatic Studies of Children with Allergic Manifestations. *Psychosomatic Medicine,* 10:275, (1948).

87. Miller, H., and Baruch, D. W. A Study of Hostility in Allergic Children. *Am. J. of Orthopsychiatry,* 20:506, (1950).

88. Regerson, C. H. Psychologic Factors in Asthma, Prurigo. *Psychosomatic Med.* 3:169 (1941).

89. Mitchell, A. J., et. al. Emotional Aspects of Pediatric Allergy — The Role of the Mother-Child Relationship. *Ann. Allergy,* 11:744-751, (1953).

90. Pounders, C. M. The Life Cycle of the Allergic Individual. *South. Med. J.,* 45:857-860, (1952).

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